lu PU11256

PATENT SPECIFICATION

736,747

Date of Application and filing Complete Specification : Aug. 31, 1953.

No. 24021/53.

Complete Specification Published : Sept. 14, 1955.

Index at acceptance:—Classes 15(1), A2X; and 140, E2A1.

COMPLETE SPECIFICATION

Improvements in and relating to Means for Applying Fluent Coatings to Web Material at Open Width

CORRECTION OF CLERICAL ERROR

SPECIFICATION NO. 736,747

The following correction is in accordance with the Decision of the Superintending Examiner, acting for the Comptroller-General, dated the seventh day of March, 1956.

Page 4, line 16, *for* "Claim 7" *read* "Claim 6".

THE PATENT OFFICE,
20th March, 1956

DB 33384/1(1)/3513 100 3/56 F

woven material: or artificial substance, e.g., sheet plastic, in a simple, efficient and regular manner.

Another object of the invention is to provide coating means that can be arranged to operate efficiently when such means trails on the surface to be coated at any angle relatively to the vertical or horizontal without limitation of position or direction of web travel, thereby enabling coating machines of large operational capacity, i.e., of a plurality of coating operations, to be compactly arranged.

With known means having an open fountain and a trailing blade it is not possible in any circumstances to apply a deposit or deposits from a vapour or vapours on to a supported and travelling web and many difficulties are encountered when successive coatings of materials have to be applied to such supported web from such open fountain when fed with solutions, emulsions or suspensions or the coating material which difficulties are enhanced when the web has to receive a deposit from a vapour as well as [illegible] to the web at a position that is limited in location, e.g., the blade cannot be located to trail on the upper or lower parts of a roller, or on the top or bottom of a flat bed, because the liquid or liquid coating must be retained in the open fountain and must flow to the contact edge of the blade by the force of gravity and practice shows that the arc within which the blade must be located or the permissible variation in the angle of a flat bed is small.

In view of the above, in machines for applying a succession of coatings, each roller must have only one blade and its associated open fountain: if two blades were applied in the available arc the time between the application of coatings would be so small as to introduce the risk of the second coating destroying the first, or of the first being ineffective to prepare for the second.

Another aspect of the same difficulty in practice is that when a web has been coated, the surface of the coating must not be touched by any roller or surface for a considerable period of time, otherwise the coating receives blemishes, thus necessitating a

[Price 3s. ~~Price 3s. 0d.~~]

Price 3

Price Price 5s. 0d.

PATENT SPECIFICATION

736,747

Date of Application and filing Complete Specification: Aug. 31, 1953.

No. 24021/53.

Complete Specification Published: Sept. 14, 1955.

Index at acceptance:—**Classes 15(1),** A2X: **and 140,** E2A1.

COMPLETE SPECIFICATION

Improvements in and relating to Means for Applying Fluent Coatings to Web Material at Open Width

I, ARTHUR RONALD TRIST, of 285, Park Street, South, Hamilton, Ontario, in the Dominion of Canada, a Subject of the Queen of Great Britain and Northern Ireland, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to improvements in means for applying a deposit or coating of any kind from a vapour or mixture of vapours (heated or not) or by a hot or cold liquid or by a composition that has a paste-like consistency when applied at a suitable temperature, to web material at open width and has for its principal object to provide means by which such deposit or coating, or great tenuity if necessary, can be applied to a web of cellulose, e.g., paper; fabric, e.g., woven material; or artificial substance, e.g., sheet plastic, in a simple, efficient and regular manner.

Another object of the invention is to provide coating means that can be arranged to operate efficiently when such means trails on the surface to be coated at any angle relatively to the vertical or horizontal without limitation of position or direction of web travel, thereby enabling coating machines of large operational capacity, i.e., of a plurality of coating operations, to be compactly arranged.

With known means having an open fountain and a trailing blade it is not possible in any circumstances to apply a deposit or deposits from a vapour or vapours on to a supported and travelling web and many difficulties are encountered when successive coatings of materials have to be applied to such supported web from such open fountain when fed with solutions, emulsions or suspensions or the coating material which difficulties are enhanced when the web has to receive a deposit from a vapour as well as material coatings, e.g., sizing, undercoating and overcoating.

One difficulty in practice with open fountains fed with a solution, emulsion or suspension of the coating material is that the coating material has to be sufficiently liquid to flow freely in the fountain under a gravity head and that due to the passage of the web past this liquid coating material in the open fountain, the contents of the fountain roll and the film of air on the web becomes incorporated in the liquid or liquid coating so that the liquid or liquid coating in the fountain is turbulated thereby and aerated with the result that the applied coating is irregular, thus producing blemishes in the coating.

Another difficulty in practice is that the relatively stationary coating blade must be applied to the web at a position that is limited in location, e.g., the blade cannot be located to trail on the upper or lower parts of a roller, or on the top or bottom of a flat bed, because the liquid or liquid coating must be retained in the open fountain and must flow to the contact edge of the blade by the force of gravity and practice shows that the arc within which the blade must be located or the permissible variation in the angle of a flat bed is small.

In view of the above, in machines for applying a succession of coatings, each roller must have only one blade and its associated open fountain: if two blades were applied in the available arc the time between the application of coatings would be so small as to introduce the risk of the second coating destroying the first, or of the first being ineffective to prepare for the second.

Another aspect of the same difficulty in practice is that when a web has been coated, the surface of the coating must not be touched by any roller or surface for a considerable period of time, otherwise the coating receives blemishes, thus necessitating a

[*Price* 3/- [redacted]

[redacted]

Price 33p

25p Price Price 6s. 0d.

continually progressing flow path for the coated web which calls for a very large expanse of valuable floor area.

All these difficulties are overcome by the present invention as the coating means forming the subject of the present invention can be arranged at any angle relatively to the vertical or horizontal, with the result that the web can be supported by a moving bed or by rollers to travel along a flow path with coating means on the top of the bed or of the roller, along a bed or over rollers with coating means on the sides of such bed or rollers and along a return flow path with coating means at the bottom of the bed or of each roller, thus enabling a compact machine with well spaced rollers to be arranged for a plurality of successive coatings and in which no roller contacts with a coated surface.

This invention consists in means for applying a deposit or coating on to the surface of moving web material supported on a moving resilient bed at open width, comprising a pressure resisting trough that is stationary relative to the moving bed and which has a mouthpiece sealed by the web for supplying the material to be deposited or coated on to such web, means for preventing indiscriminate leakage of the deposit or coating from the mouthpiece, a springy lip forming part of the mouthpiece and trailing in lightly stressed contact on the surface of the supported web for controlling the quantity of the deposit or coating applied to the web and means for forcing the material to be deposited or coated on to the web into the trough under pressure.

In the drawings accompanying this complete specification:—

Fig. 1 is a fragmentary diagrammatic detail view showing substantially horizontally arranged coating means applied to a downwardly travelling web;

Fig. 2 is a schematic view showing coating means similar to that shown in Fig. 1, arranged to apply a coating to a web on the upper part of a cylindrical bed;

Fig. 3 is a schematic view showing coating means similar to that shown in Fig. 1, arranged to apply a coating to a web on the underside of a cylindrical bed;

Fig. 4 is a schematic view showing the substantially horizontally arranged coating means of Fig. 1, applied to an upwardly travelling web;

Fig. 5 is a detail view of a modification with parallel blades;

Fig. 6 is a plan view of the coating means shown in Fig. 1;

Fig. 7 is a longitudinal section of Fig. 1 taken on the line VII—VII of that figure: and

Fig. 8 is a diagrammatic view showing the invention applied to a flat moving resilient bed.

In the examples shown in the drawings, 1 is the first springy lip that controls the quantity of coating material applied or the thickness of the coating, hereinafter called the controlling lip, 2 is the second springy lip, hereinafter called the sealing lip, 3 is the web, and 4 is part of a rotatable cylinder with the clothing 5 of the resilient material.

Needless to say, the rotatable cylinder 4, with the clothing 5 of resilient material may be replaced by an endless belt or band 51 of resilient material locally supported under each assembly of controlling lip 1 and sealing lip 2 by a roller 41, as shown in Fig. 8, and in the following description any reference to the clothing 5 is to be read to include the band 51.

The springy lips 1 and 2 are made of thin sheet material and are pressed against the surface of the clothing 5 so that, on the one hand, the lips 1 and 2 are slightly flexed and, on the other hand, the surface of the clothing 5 is slightly depressed, thus securing the yielding co-operation of the controlling lip 1 with the web 3 supported by the resilient clothing 5 that is essential to the production of a perfectly even coating of microscopic thinness and also the yielding co-operation of the sealing lip 2 with the web 3 that in practice acts to smooth the surface of the web 3, or the surface of any preliminary coating thereon, immediately preparatory to the application of the coating.

Whilst the machine is at rest the flexing of the lips 1 and 2 is effected mechanically but when the machine is in operation the flexing is effected by the pressure with which the vapour or coating material is fed into the trough that is to say the pressure tends to lift the controlling lip 1 from off the web 3 and press the sealing lip 2 more firmly against the web 3.

The lips 1 and 2 are made of any thin flexible springy material, e.g., of steel or other metal, alloy or material of a kind that will not impart any blemish to the web or coating applied thereto and the clothing 5 is made of any resilient material, e.g., of natural or artificial indiarubber or other substance unaffected deleteriously by the conditions of use, the degrees of springiness and resilience being selected so that the slight flexure produces the slight depression necessary to the required mutual co-operation.

Certain kinds of plastic compositions have to be handled and applied to the web 3 in a melted condtion and to facilitate this the cylinder 4 or rotatable rollers 41 and/or the external layer of resilient material can be heated in any known manner by a heated gas or vapour, heated fluid, electrical heaters or such like, whilst in some cases the trough, mouthpiece and/or one or both of the lips also may be heated.

The controlling lip 1 is mounted on the

rigid stock 11 and is clamped thereto by the plate 12 secured in position by screws 13, bolts or other clamping means of a known kind, whilst the sealing lip 2 is mounted on the rigid stock 21, being clamped in position by a plate 22 secured by means such as the screws 23 or the like, it being understood that the unsupported margins of both the controlling lip 1 and the sealing lip 2 in contact with the web 3 are quite free to be slightly flexed, are quite parallel and that the extreme contact edges of the lips 1 and 2 are straight.

The rear edges of the rigid stocks 11 and 21 are attached to the rear wall 6 by means of the bolts 9, screws or the like to form a trough, and the rear wall 6 is provided with the feed pipe 10, but it will be obvious that the stocks 11 and 21 and the rear wall 6 may be constructed as a single part.

The stocks 11 and 21, the flexible margins of the lips 1 and 2, the supported web 3 and the rear wall 6 form the longitudinal walls of a compartment that is used to distribute the supply from the feed pipe 10, and when the ends of such compartment are closed, e.g., by dykes 14, reinforced by the angular flow diverting elements 141 to seal the corner formed by the adjacent surfaces of the stock 11 and dyke 14, to apply coating material to the area of the web 3 exposed between the lips 1 and 2.

To prevent leakage of the coating composition past the ends of the lips 1 and 2, the surface of each of the dykes 14 adjacent to such lips is provided with packing material 15 impervious to the coating composition and sufficiently soft to yield readily to the small displacement of the lips 1 and 2 when slightly flexed, thus maintaining the perfection and regularity of the coating applied.

The stances of the lips 1 and 2 unflexed may be nearly radial or nearly tangential to the surface of the clothing 5 or band 51, usually at least one of the lips is arranged to be tangential to a circle of a diameter less than the diameter of the surface of the clothing 5, as shown in Fig. 1, the other of the lips being similarly tangential, as shown in that figure, or parallel to the tangential lip, as shown in Figs. 2, 3, 4 and 5, the only limiting condition being that both the lips 1 and 2 smoothly and consistently trail on the web 3 when it is in motion.

The compartment formed by the lips 1 and 2, the stocks 11 and 21, the rear wall 6, the dykes 14 the angular flow diverting element 141 and the web 3 may be supplied through the feed pipe 10 under the hydrostatic head of a gravity tank 7, as shown in Fig. 1, when the web 3 is to be wetted with water, coated with a thin size or a very liquid coating composition that flows freely, in which case the volume of the compartment may be small to discourage the objectionable rolling and deleterious aeration of the liquid in the compartment.

When a paste-like composition is to be applied to the web 3, then the volume of the compartment may be larger and the composition can be forced into the compartment by any pump contrivance 8 exerting the requisite pressure, as schematically shown in Fig. 3. Further, when a liquid is to be condensed from a vapour on to the web 3, then the compartment may be very small and be fed with the vapour in any convenient way.

From the above it will be obvious that the new coating means described above is in the form of a positively fed coating trough with springy lips that will apply a coating of any kind to any surface at any angle regardless of the direction of movement of such surface provided that the lips trail on the surface and have line contact therewith.

Moreover, the new coating means can apply a coating composition of any kind that is fluent, when heated or not, thus enabling compositions of paste-like consistency to be used, thereby saving some of the time usually absorbed in evaporating useless moisture as well as reducing the time period between successive coatings, so that a machine of a given output can be very compactly arranged.

What I claim is:—

1. Means for applying a deposit or coating on to the surface of moving web material supported on a moving resilent bed at open width, comprising a pressure resisting trough that is stationary relative to the moving bed and which has a mouthpiece sealed by the web for supplying the material to be deposited or coated on to the web, means for preventing indiscriminate leakage of the deposit or coating from the mouthpiece, a springy lip forming part of the mouthpiece and trailing in lightly stressed contact on the surface of the supported web for controlling the quantity of the deposit or coating applied to the web and means for forcing the material to be deposited or coated on to the web into the trough under pressure.

2. Means according to Claim 1, characterised in that the mouthpiece has a springy sealing lip trailing on the surface of the supported web in precedence of the controlling lip and dykes arranged between the lips at the edges of the web material, the lips and dykes constituting means for preventing indiscriminate leakage of the deposit or coating from the pressurised trough through the mouthpiece.

3. Means according to Claim 2, characterised in that the pressure with which the springy sealing lip on the mouthpiece is pressed into contact with the surface of the resiliently supported moving web is augmented by the pressure in the trough.

4. Means according to any of the preced-

ing claims, characterised in that each springy lips is flexed slightly to depress the surface of the resiliently supported moving web along the whole of the lengths of the contact edge to secure mutual yielding co-operation of the edge with the surface.

5. Means according to any of the preceding claims, characterised in that the web material is supported by a rotating resilient roller that may be heated.

6. Means according to Claims 1 to 4 or any of them, characterised in that the web material is supported by a rotating roller comprising a rigid cylinder having an external layer of resilient material.

7. Means according to Claim 7, characterised in that the cylinder and/or the external layer of resilient material may be heated.

8. Means according to Claims 1 to 4 or any of them, characterised in that the web material is supported by a band or belt of resilient material supported on and advanced by rotating rollers that may be heated.

9. Means according to any of the preceding claims, characterised in that the material to be deposited or coated on the surface of the web material is applied to the surface of the web material in a heated condition.

10. Means according to Claim 9, characterised in that the trough, the mouthpiece and/or the springy lips may be heated to facilitate the flow of the deposit or coating.

CHAS. J. R. BULLOUGH,
8, Somerhill Court, Holland Road, Hove,
Sussex, England,
Chartered Patent Agent,
Agent for the Applicant.

Printed for Her Majesty's Stationery Office by Wickes & Andrews, Ltd., E.C.4. 684/2.—1955.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

FIG. 2

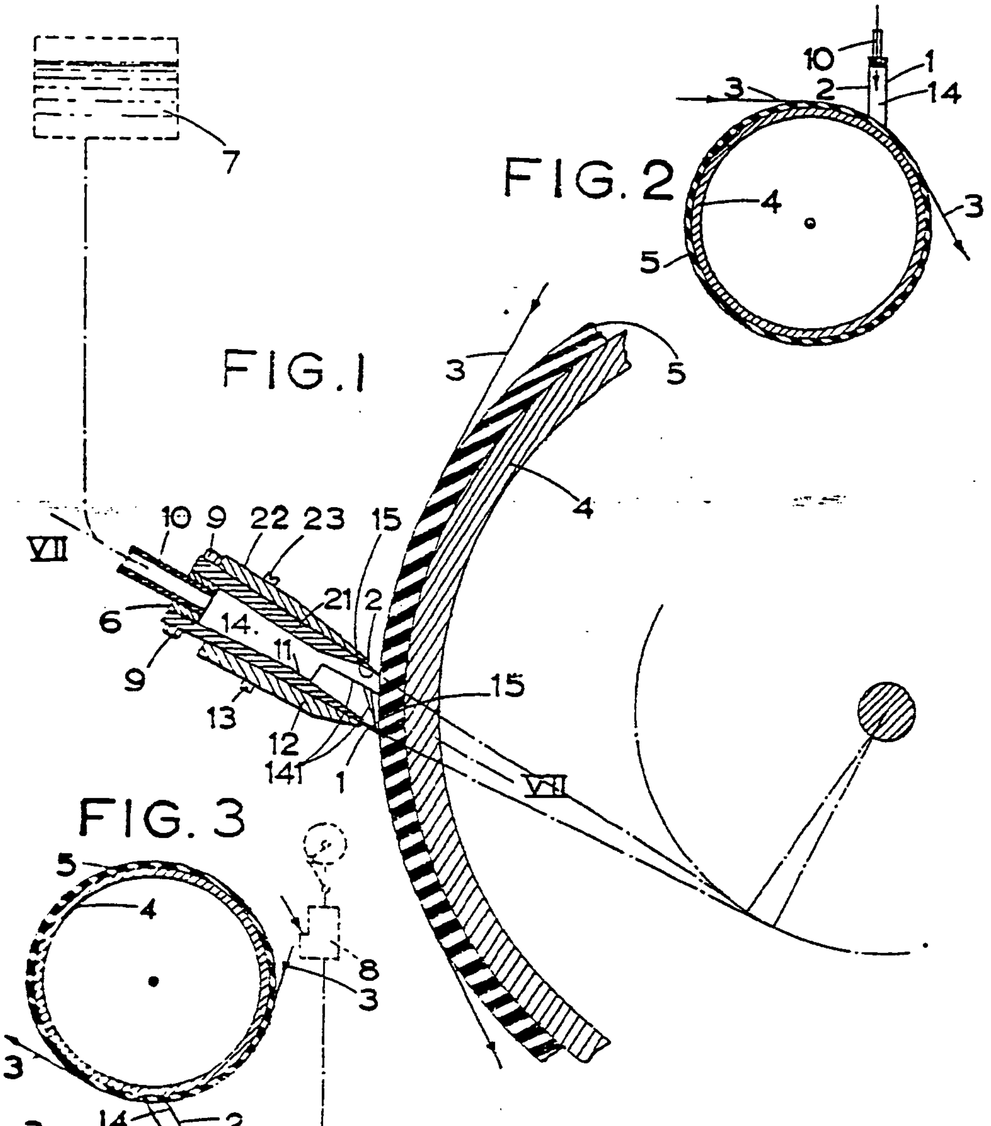


FIG. 1

FIG. 3

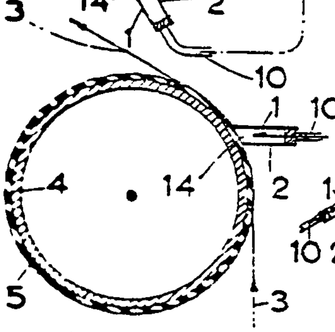


FIG. 4

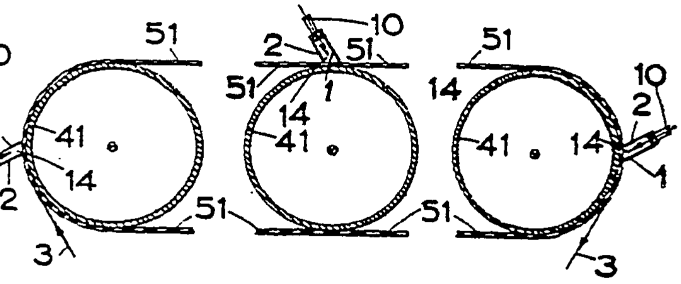


FIG. 8

736,747 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale.*
SHEETS 1 & 2

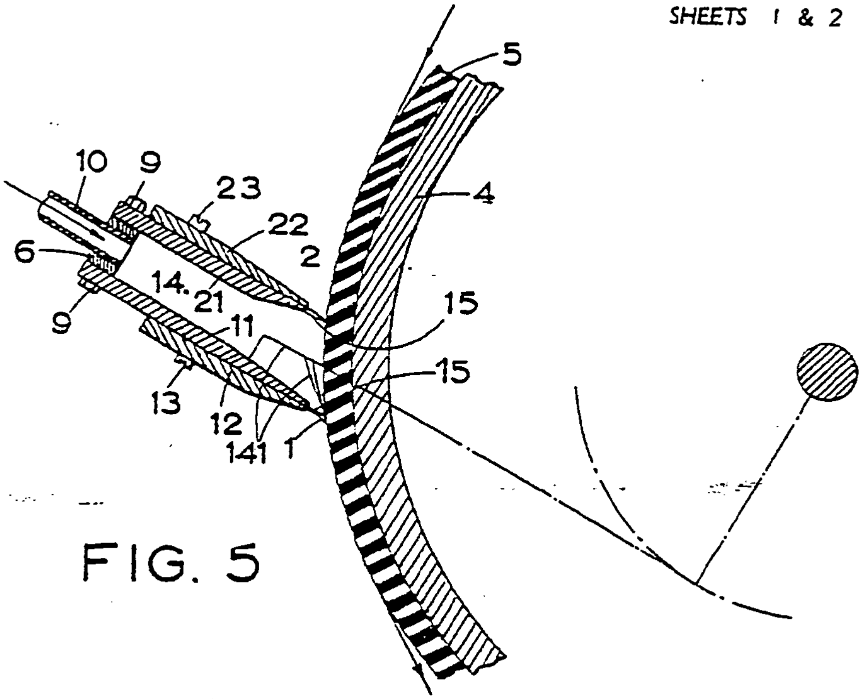


FIG. 5

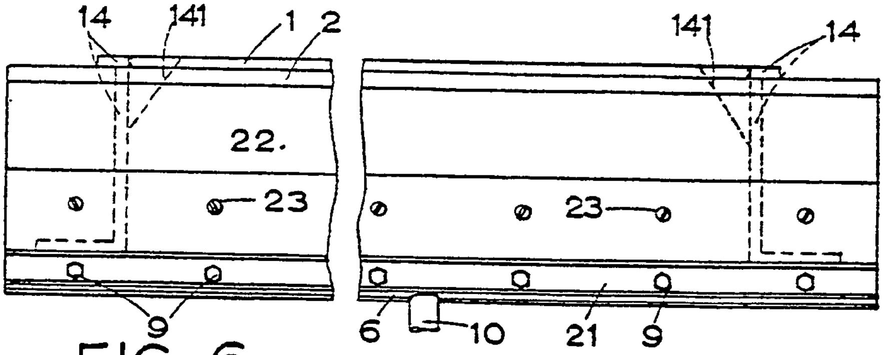
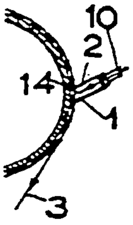


FIG. 6



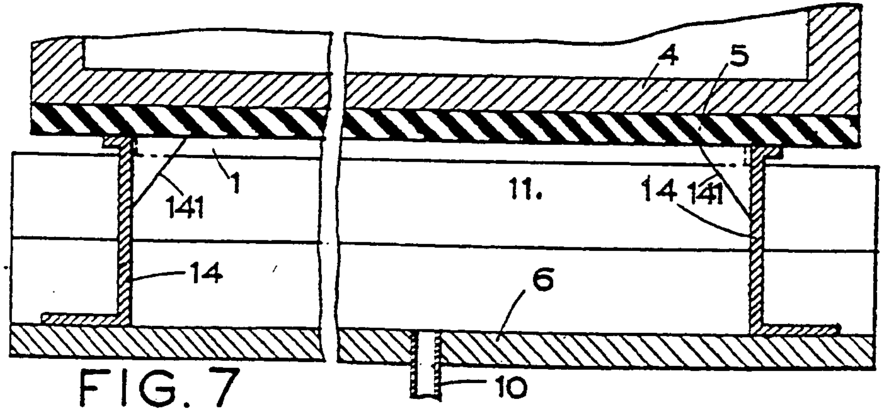


FIG. 7

736,747 COMPLETE SPECIFICATION
2 SHEETS

This drawing is a reproduction of the Original on a reduced scale.
SHEETS 1 & 2

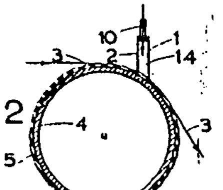


FIG. 2

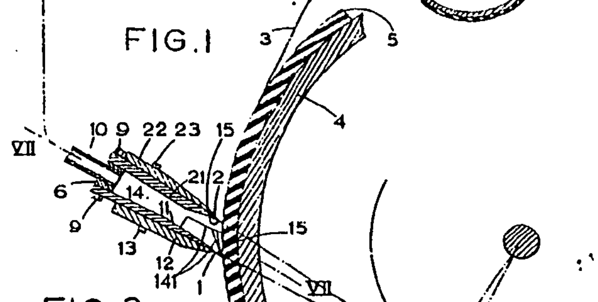


FIG. 1

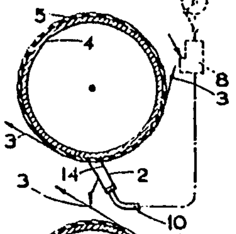


FIG. 3

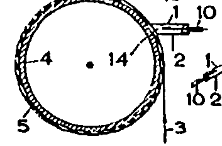


FIG. 4

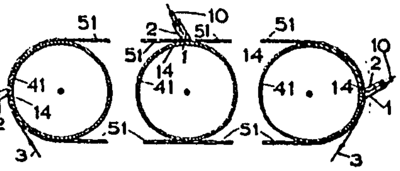


FIG. 8

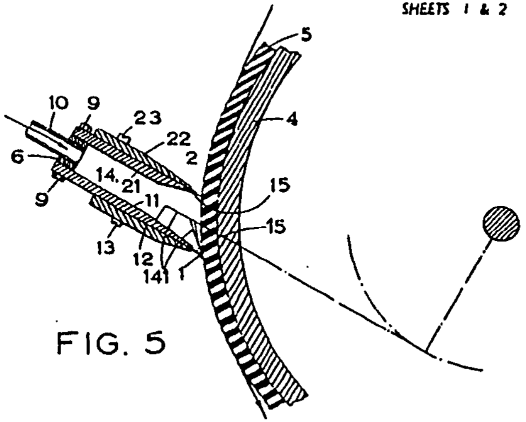


FIG. 5

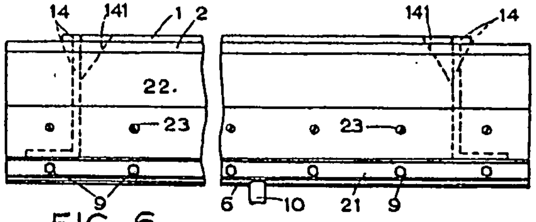


FIG. 6

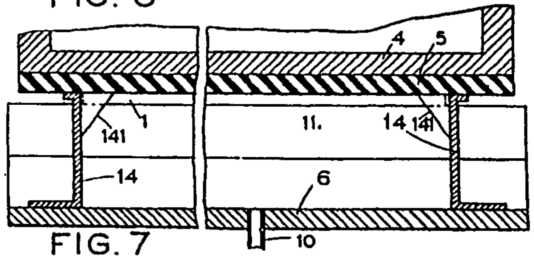


FIG. 7